CLAIMS

1. A method of antenna configuration characterized in that the antenna comprising a plurality of antenna elements is configured such that the antenna elements separation is set in relation to communications distance.

2. The method according to claim 1 characterized in that the antenna is configured such that the antenna elements separation is set in relation to communications wavelength.

3. The method according to claim 1 or 2 characterized in that the antenna configuration maximizes MIMO channel capacity.

4. The method according to claim 1 or 2 characterized in that for a linear antenna the antenna elements separation is set in relation to $\sqrt{D\lambda/N}$, where D is communications distance, λ is communication wavelength and N is number of antenna elements.

5. The method according to claim 1 or 2 characterized in that for a square grid antenna the antenna elements separation is set in relation to $\sqrt{D\lambda/\sqrt{N}}$, where D is communications distance, λ is communication wavelength and N is number of antenna elements.

6. The method according to claim 5 characterized in that $N=n^2$ for n an integer greater than 1.

7. The method according to claim 1 or 2 characterized in that for a rectangular grid antenna the antenna elements separation is set in relation to $\sqrt{D\lambda/N}$,

where D is communications distance, λ is communication wavelength and N is number of antenna elements in dimension of separation.

8. The method according to claim 7 c h a r a c t e r i z e d i n that the dimension of separation is horizontal dimension.

9. The method according to claim 7 c h a r a c t e r i z e d i n that the dimension of separation is vertical dimension.

10. The method according to claim 1 or 2 c h a r a c t e r i z e d i n that for a triangular grid antenna with three antenna elements the antenna element separation is set in relation to $\sqrt{D\lambda / 3}$, where D is communications distance and λ is communication wavelength.

11. A method of antenna configuration c h a r a c t e r i z e d i n that an antenna comprising a plurality of clusters of one or more antenna elements is configured such that the clusters are separated by a distance set in relation to communications distance.

12. The method according to claim 11 c h a r a c t e r i z e d i n that the antenna is configured such that the clusters of antenna elements are separated by a distance set in relation to communication wavelength.

13. The method according to claim 11 or 12 c h a r a c t e r i z e d i n that for a linear antenna the clusters are separated by a distance set in relation to $\sqrt{D\lambda/L}$, where D is communications distance, λ is communication wavelength and L is number of clusters.

14. The method according to claim 11 or 12 characterized in that for a square grid antenna the clusters are separated by a distance set in relation to $\sqrt{D\lambda / \sqrt{L}}$, where D is communications distance, λ is communication wavelength and L is number of clusters.

15. The method according to claim 14 characterized in that $L=l^2$ for l an integer greater than 1.

16. The method according to claim 11 or 12 characterized in that the antenna elements within a cluster are separated by a distance smaller than the smallest distance between clusters.

17. The method according to claim 1 or 2 characterized in that the antenna configuration is three-dimensional.

18. The method according to claim 17 characterized in that the antenna configuration comprises two layers, where each layer comprises a planar arrangement of antenna elements on a square grid.

19. The method according to claim 17 characterized in that the antenna configuration comprises antenna elements positioned equidistant in a three-dimensional space.

20. The method according to claim 19 characterized in that the antenna elements are positioned to vertices of a cube.

21. The method according to claim 19 characterized in that the antenna elements are positioned to vertices of a tetrahedron.

22. The method according to any of claims 1, 2, 11 and 12 c h a r a c t e r i z e d i n that the antenna elements are fed with signals processed according to singular value decomposition for a transmission channel over the communications distance.

23. The method according to claim 22 c h a r a c t e r - i z e d i n that the transmission channel considered is a flat fading sub-carrier.

24. The method according to claim 22 c h a r a c t e r - i z e d i n that the transmission channel considered is an OFDM sub-carrier.

25. The method according to any of claims 1, 2, 11 and 12 c h a r a c t e r i z e d i n that the signals received from the antenna elements are processed according to zero forcing for a transmission channel over the communications distance.

26. The method according to any of claims 1, 2, 11 and 12 c h a r a c t e r i z e d i n that the signals received from the antenna elements are processed to minimize mean square error for a transmission channel over the communications distance.

27. The method according to any of claims 1, 2, 11, 12, 22 and 25 c h a r a c t e r i z e d i n that signal processing of signals received or to be transmitted is performed at high-frequency.

28. The method according to claim 27 c h a r a c t e r - i z e d i n that the processing is performed by one or more 3-dB hybrids.

29. The method according to claim 27 c h a r a c t e r i z e d i n that the processing is performed by one or more Butler matrix directional couplers.

30. The method according to claim 27 c h a r a c t e r i z e d i n that the processing is performed by an arrangement of microstrip.

31. The method according to claim 27 c h a r a c t e r i z e d i n that the processing is performed by an arrangement of waveguides.

32. The method according to any of claims 1-31 c h a r a c t e r i z e d i n that the antenna configuration is a radio antenna configuration.

33. The method according to any of claims 1-31 c h a r a c t e r i z e d i n that the antenna configuration is a configuration of sensors or actuators for optical communications.

34. An antenna configuration c h a r a c t e r i z e d b y the antenna comprising a plurality of antenna elements configured such that the antenna elements separation is set in relation to communications distance.

35. The antenna configuration according to claim 34 c h a r a c t e r i z e d b y the antenna is configured such that the antenna elements separation is set in relation to communication wavelength.

36. The antenna configuration according to claim 34 or 35 c h a r a c t e r i z e d i n that the antenna configuration maximizes MIMO channel capacity.

37. The antenna configuration according to claim 34 or 35 c h a r a c t e r i z e d b y the antenna elements sepa-

ration is set in relation to $\sqrt{D\lambda/N}$, where D is communications distance, λ is communication wavelength and N is number of antenna elements, and wherein the antenna configuration is a linear antenna configuration.

38. The antenna configuration according to claim 34 or 35 characterized by the antenna elements separation is set in relation to $\sqrt{D\lambda/\sqrt{N}}$, where D is communications distance, λ is communication wavelength and N is number of antenna elements, and wherein the antenna configuration is a square grid antenna configuration.

39. The antenna configuration according to claim 38 characterized in that $N=n^2$ for n an integer greater than 1.

40. The antenna according to claim 34 or 35 characterized by the antenna elements separation is set in relation to $\sqrt{D\lambda/N}$, where D is communications distance, λ is communication wavelength and N is number of antenna elements in dimension of separation, for a rectangular grid antenna.

41. The antenna according to claim 40 characterized in that the dimension of separation is horizontal dimension.

42. The antenna according to claim 40 characterized in that the dimension of separation is vertical dimension.

43. The antenna according to claim 34 or 35 characterized by the antenna elements separation is set in relation to $\sqrt{D\lambda/3}$, where D is communications distance

and λ is communication wavelength, a triangular grid antenna with three antenna elements.

44. The antenna configuration according to claim 34 or 35 characterized by the antenna configuration being three-dimensional.

45. The antenna configuration according to claim 44 characterized by the antenna configuration comprising two layers, where each layer comprises a planar arrangement of antenna elements on a square grid.

46. The antenna configuration according to claim 44 characterized by the antenna configuration comprising antenna elements positioned equidistant in a three-dimensional space.

47. The antenna configuration according to claim 46 characterized by the antenna elements being positioned to vertices of a cube.

48. The method according to claim 46 characterized by the antenna elements being positioned to vertices of a tetrahedron.

49. An antenna configuration characterized by an antenna comprising a plurality of clusters of one or more antenna elements configured such that the clusters are separated by a distance set in relation to communications distance.

50. The antenna configuration according to claim 49 characterized by the antenna being configured such that the clusters of antenna elements are separated by a distance set in relation to communication wavelength.

51. The antenna configuration according to claim 49 or 50 characterized by the clusters being separated by a distance set in relation to $\sqrt{D\lambda/L}$, where D is communications distance, λ is communication wavelength and L is number of clusters, and wherein the antenna configuration is a linear antenna configuration.

52. The antenna configuration according to claim 49 or 50 characterized by the clusters being separated by a distance set in relation to $\sqrt{D\lambda/\sqrt{L}}$, where D is communications distance, λ is communication wavelength and L is number of clusters and wherein the antenna configuration is a square grid antenna configuration.

53. The antenna configuration according to claim 52 characterized in that $L=l^2$ for l an integer greater than 1.

54. The antenna configuration according to claim 49 or 50 characterized in that the antenna elements within a cluster are separated by a distance smaller than the smallest distance between clusters.

55. The antenna configuration according to any of claims 34, 35, 49 and 50 characterized by one or more antenna element feeders adapted to feed the antenna elements with signals processed according to singular value decomposition for a transmission channel over the communications distance.

56. The antenna configuration according to claim 55 characterized in that the transmission channel considered is a flat fading sub-carrier.

57. The antenna configuration according to claim 55 c h a r a c t e r i z e d i n that the transmission channel considered is an OFDM sub-carrier.

58. The antenna configuration according to any of claims 34, 35, 49 and 50 c h a r a c t e r i z e d b y one or more processing elements adapted to process signals received from the antenna elements according to zero forcing for a transmission channel over the communications distance.

59. The antenna configuration according to any of claims 34, 35, 49 and 50 c h a r a c t e r i z e d b y one or more processing elements adapted to process signals received from the antenna elements to minimize mean square error for a transmission channel over the communications distance.

60. The antenna configuration according to any of claims 34, 35, 49, 50, 55 and 58 c h a r a c t e r i z e d b y one or more processing elements adapted to process at high-frequency signals received or to be transmitted.

61. The antenna configuration according to claim 60 c h a r a c t e r i z e d b y the one or more processing elements being one or more 3-dB hybrids.

62. The method according to claim 27 c h a r a c t e r i z e d b y the one or more processing elements being one or more Butler matrix directional couplers.

63. The antenna configuration according to claim 60 c h a r a c t e r i z e d b y the one or more processing elements being an arrangement of microstrip.

64. The antenna configuration according to claim 60 c h a r a c t e r i z e d b y the one or more processing elements being an arrangement of waveguides.

65. The antenna configuration according to any of claims 34-64 c h a r a c t e r i z e d b y the antenna elements being electrically active elements.

66. The antenna configuration according to any of claims 34-64 c h a r a c t e r i z e d b y the antenna elements being directors.

67. The antenna configuration according to claim 66 c h a r a c t e r i z e d b y the directors being reflectors.

68. The antenna configuration according to any of claims 34-67 c h a r a c t e r i z e d b y the antenna elements being arranged circular symmetrically.

69. The antenna configuration according to any of claims 34-67 c h a r a c t e r i z e d b y the antenna elements being arranged in a hexagonal pattern.

70. The antenna configuration according to any of claims 34-67 c h a r a c t e r i z e d b y the antenna elements being mounted on position adjustable rods or wires.

71. The antenna configuration according to claim 70 c h a r a c t e r i z e d b y the position adjustable rods or wires being electromechanically adjustable.

72. The antenna configuration according to claim 71 c h a r a c t e r i z e d i n that the adjustable position is adaptive to propagation channel properties corresponding to a measured channel matrix.

73. The antenna configuration according to any of claims 34-69 characterized by the antenna configuration being adapted to a predetermined range of communications distances.

74. An antenna configuration characterized by the antenna configuration comprising a plurality of antenna elements, of which a subset forms an active set of antenna elements, the active antenna elements forming an antenna configuration according to any of claims 34-69.

75. The antenna configuration according to any of claims 34-74 characterized in that the antenna configuration is a radio antenna configuration.

76. The antenna configuration according to any of claims 34-74 characterized in that the antenna configuration is a configuration of sensors or actuators for optical communications.

77. A communications system characterized by means for carrying out the method in any of claims 1-31.

78. A communications system characterized by a plurality of devices in any of claims 34-74.

79. The communications system according to claim 78 characterized in that the antenna elements distances are set different for a first and a second antenna, the two antennas operating in pair, such that the geometrical average of the elements distance of the first antenna, d_1 and the elements distance of the second antenna, d_2, is the effective antenna elements distance.